

SOMATIC CHROMOSOMES OF THREE SPECIES OF HAEMANTHUS

J. B. GOUWS

(University College of the Western Cape)

(With Plate XXV)

The genus *Haemanthus*, which is becoming more popular either as a garden or a pot plant, has, as yet, received very little attention from cytologists. The plants grow very well under cultivation and are easily obtainable in nature. Provisional investigation of the chromosomes already set some interesting cytological problems and, with these in mind, it was decided to determine the $2n$ numbers as a first step in a more complete cytological investigation. The present paper reports on the somatic chromosomes of three species of the genus that have hitherto not been investigated. The bulbs have been obtained from widely different areas where they grow naturally.

Comparison of permanent slides prepared according to Warmke's (1) and McClintock's (2) methods and temporary slides showed that dehydration invariably caused a certain degree of shrinkage. To prevent this, only temporary slides were used for the investigation.

Specimens were potted in pure sand and allowed to grow for some months before they were inspected for root-tips. These were fixed in Carnoy prepared according to Johansen's (3) second formula. After $2\frac{1}{2}$ hours fixation the root-tips were transferred to 70% alcohol for 24 hours. This procedure seems to improve the stainability of the chromosomes considerably. Maceration was performed in N. H. Cl at 60°C for 8 minutes and the root-tips were then transferred to Feulgen dye prepared according to the formula of Heitz (4). After three hours staining the root-tips were squashed, ringed with glycerine jelly and kept in the refrigerator for another 24 hours. This again seemed to improve the coloration of the chromosomes.

The slides were inspected with a Wilt student's microscope fitted with a 100x fluotar oil-immersion lens and 10x eyepiece. Suitable complexes were photographed with a Leica camera and drawn at table level by means of a Wilt drawing-tube.

Species	RESULTS	
	2n Number	Area
<i>H. katharinae</i> Baker	18	Chalbe desert, N. Kenya
<i>H. tigrinus</i> Jacq.	16	Faure, S.W. Cape
<i>H. puniceus</i> Jacq.	18	Boesmansrivier mouth, Cape.

TABLE I

DISCUSSION

The genus has, as yet, received very little attention from cytologists. Sato (5) was the first to report that *H. albiflos* has $2n = 16$ chromosomes. Gouws (6) was the first to report $2n = 18$ for *H. magnificus* and $2n = 16$ for *H. nelsoni*. These numbers were corroborated by Wilsenach (personal communication).

H. katharinae has a very wide distribution, ranging from various areas in the Cape Province to the Chalbe desert, close to the Ethiopian border where the author collected the specimen here reported on.

Only well developed metaphase figures were chosen for the purpose of further study. Figures 3 and 4 of *H. puniceus* show the difference between a well developed metaphase complex and one in pro-metaphase.

Although there is much similarity between the different complexes there are also obvious differences as the following formulae show:—

<i>H. katharinae</i>	2.l.L; 2.l.f; 5.b.L.
<i>H. tigrinus</i>	1.l.L; 1.l.V; 1.l.f; 1.b.f; 1.b.L; 2.b.V.
<i>H. puniceus</i>	1.l.L; 2.l.f; 2.m.f; 4.b.L.

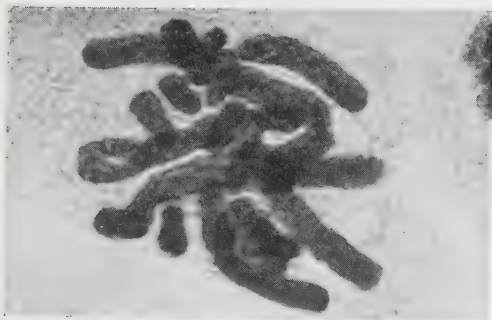
TABLE 2. l(ongum)—long; m(edium)—; b(revis)—short.

V, L & f indicate the median, sub-median and sub-terminal positions respectively of the kinetochore.

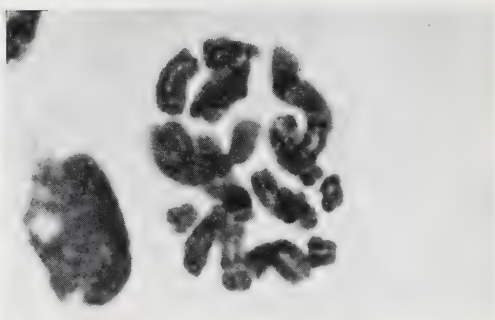
The chromosomes of the genus are exceptionally large with the result that the smaller chromosomes are often obscured by the larger ones.

Photomicrograph 4 has been added because it clearly shows the double nature of each chromatid during metaphase. Each chromosome shows three rows of light dots. One row on each chromatid caused by the spirals of 2 chromonemata. The middle row of dots is formed by the loops in the adjacent chromatids at their line of junction.

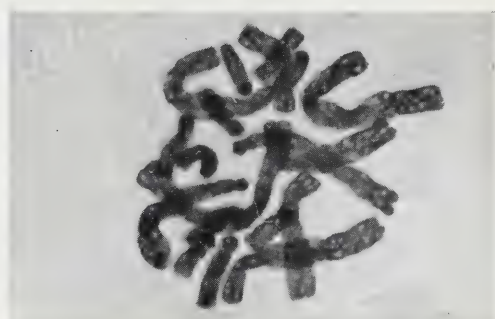
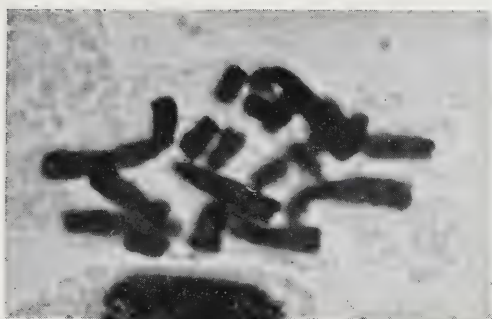
In 1949 Gouws (6) expressed the opinion that the 18 chromosome species may have arisen by the duplication of a pair of the short chromosomes. The opposite view was held by Wilsenach, who reasoned that the bulb (*H. nelsoni*) is a more highly developed form than the corm (*H. magnificus*). The 16 chromosome complex of the bulbous form should therefore be the derived complex.



PHOTOMICROGRAPH 1.—*H. katharinae* Baker.



PHOTOMICROGRAPH 2.—*H. tigrinus* Jacq.



PHOTOMICROGRAPH 3 and 4.—*H. puniceus* Jacq.

In the present investigation the two numbers 16 and 18 were both found for bulbous species. It would therefore appear that the development within the genus is a complex one which probably included many morphological aberrations in the chromosomes as well as a change in the $2n$ number. This latter change, however, does not seem to be associated with the development of either corm or bulb.

The chromosomes of *H. katharinae* are obviously longer and thicker than those of any other *H. sp.* yet investigated. Whether this is due to a laxity in the chromonemal spiralization or longer chromonemata is a point worthy of further investigation.

The varieties and forms of *H. katharinae* indigenous to Southern Africa are yet to be studied and compared to the results obtained from the specimen collected in the Chalbe desert.

REFERENCES

- WARMKE, H. E. 1935. A permanent root-tip smear method. S.T. **10**: 101-3. (1)
WARMKE, H. E. 1941. A section-smear method for plant cytology. S.T.
MCCLINTOCK, B. A. 1929. A method for making aceto-carmyn smears permanent. S.T. **4**: 53-6. (2)
JOHANSEN, D. A. 1940. Plant microtechnique. (3)
HEITZ, E. 1936. Die Nucleal-Quetschmethode. Ber. d. bot. Ges. **53**: 870-8. (4)
SATO, D. 1938. Cytologia **9**, 203-1938. (5)
GOUWS, J. B. 1949. Karyology of some South African Amaryllidaceae. Plant Life (Herb.) **5**: 54-81. (6)



FIG. 1 *Haemanthus katharinae* Baker.

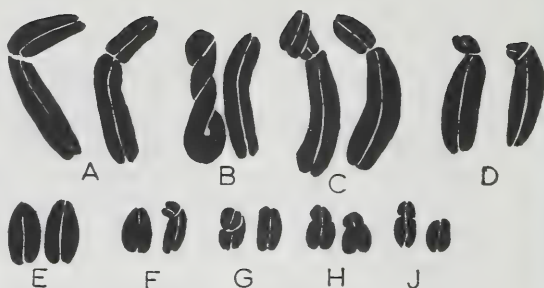


FIG. 1 *Haemanthus katharinae* Baker.

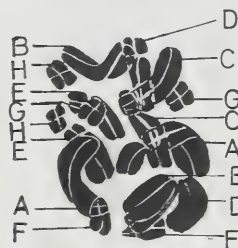


FIG. 2 *Haemanthus tigrinus* Jacq.



FIG. 2 *Haemanthus tigrinus* Jacq.

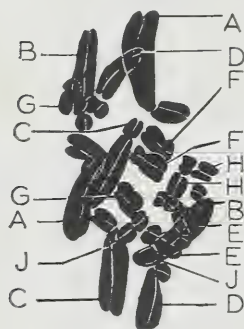


FIG. 3 *Haemanthus puniceus* Jacq.

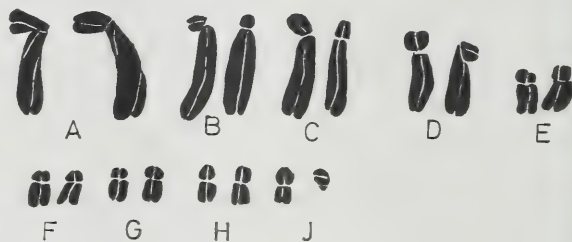


FIG. 3 *Haemanthus puniceus* Jacq.

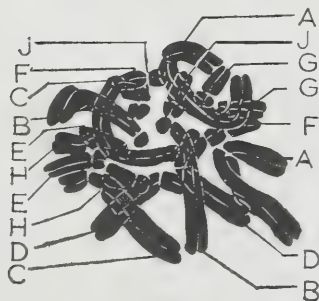


FIG. 4 *Haemanthus puniceus* Jacq.

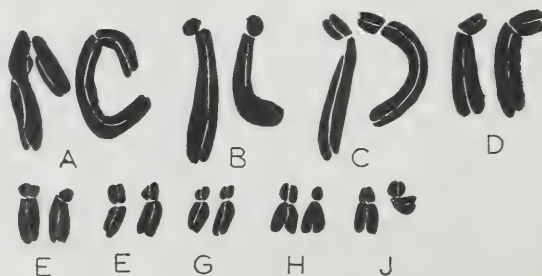


FIG. 4 *Haemanthus puniceus* Jacq.